

Cobram- Barooga Bridge over the River Murray

(This article by Don Fraser is a good illustration of how engineers can assist the community in achieving practical conservation – Ed.)

The River Murray is one of Australia's most important waterways and its history is a significant component of Australia's development. Part of that significance has been the construction of infrastructure to suit navigation, wharves, weirs, locks and bridges.

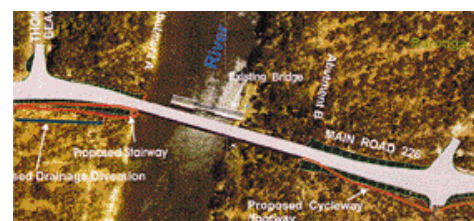
From the beginning of settlement in the 1830s, south of the river to become the future Victoria, and north in the Riverina Region of New South Wales, crossing the river soon became commonplace. For some fifty years, toll-ferries and rowing boats had a monopoly of crossing business.

By the 1890s the limited capacity of the ferries became a hindrance to the steadily increasing road traffic such that the Colonial Governments of New South Wales and Victoria began a joint program of building bridges suitable for the large population of paddle steamers, at the height of the River Trade, and for land-based transport.

High-level bridges were the ideal, but the combination of expensive river spans and long approach viaducts graded to suit horse/bullock-drawn drays made this option too costly. The affordable alternative was low-level bridges with moveable spans. This solution had already been anticipated when in 1858 Henry Hopwood established a pontoon bridge at Echuca.



The expected river view after the new bridge is complete



Cobram bridge site plan

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The 1885 Craven Bros Crane

Members of Engineering Heritage Australia (Newcastle) have been engaging in practical conservation for almost two years by maintaining and demonstrating the 1885 rope-driven gantry crane situated in the former Honeysuckle Railway Workshops in Newcastle. As far as is known, the crane is the only similar crane still in its original operating configuration anywhere in the world.

The Craven Crane (as it is known) is a 16 ton overhead travelling crane manufactured in Manchester, England in 1885 by Craven Brothers Ltd, one of the best known manufacturers of cranes in the late 19th and early 20th centuries. The crane is driven by a continuously circulating hemp rope which runs the length of the workshop building. The rope engages three large pulleys on the side of the crane carriage, each of which is connected to a motion of the crane via a pair of leather belts, one straight, one twisted. A system of levers moves either the straight or the twisted belt from a free pulley to an engaged pulley depending on the direction of motion required: the three motions are travel along the building, crabbing of the winch across the building and winch operation. The winch has two hoists, each with two speeds, and changes between the hoists and between speeds are made by engaging and disengaging dog clutches (with difficulty!).

The crane demonstrates the highest point reached by 19th century mechanical power transmission technology prior to



The pulleys and pairs of belts for the three crane motions

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National Cultural Heritage Forum

In November I attended a two-day workshop conducted by the National Cultural Heritage Forum, a broad group which provides feedback to the Minister for Environment and Heritage David Kemp and the Australian Heritage Commission on cultural heritage issues. There were representatives from ICOMOS, the National Trust, historical societies, architects, engineers, archaeologists, State heritage councils, the Australian Heritage Commission and more.

A detailed briefing was given on the new national heritage legislation which provides real protection for heritage places and intends to involve all levels of government down to the local level in a cooperative manner. The new regime was launched in January 2004 and major information sessions will take place throughout the year.

The Forum is acutely aware that the Natural Heritage Trust has spread its largesse (from the partial sale of Telstra) far and wide, whilst cultural heritage (covering historic and Indigenous heritage) has been relatively neglected. There is an urgent need to raise the profile of cultural heritage for funding to be attracted.

A draft visions statement, which enables a diverse group to move forward together, was produced covering 16 different heritage issues: the current status, a vision and some initial steps were set out. Then a list of budget priorities for 2004-05 was extracted from the visions. These included ways of raising the profile of cultural heritage, expanding the Cultural Heritage Places Program, a pilot Heritage Care project based on the Land Care program, and improving the heritage section of the State of the Environment Report.

There is a good case for providing tax incentives to attract sponsorship and encourage private owners to maintain their heritage properties. A stronger link between tourism and heritage was considered a means to make more heritage sites viable particularly in rural areas.

Bruce Cole, Chair EHA

(It is disappointing to see governments, in fact, doing the reverse of what was recommended. The NSW government has removed the Land Tax concessions for owners of listed properties. – Ed.)

New Plaquing Guidelines

The Committee of EHA has adopted revised guidelines to be followed by those submitting engineering works to be recognized and plaqued by Engineers Australia. The new guidelines publication can be accessed from the EHA pages of the Engineers Australia website.

The new guidelines were developed with the aim of bringing heritage assessments used by EHA into line with those used by Commonwealth and State heritage authorities in Australia. The assessment criteria are now, as much as possible, the same as those used by State Heritage Councils. Differences occur where the different states use slightly different criteria and compromises had to be made. Nevertheless, the assessments undertaken for plaquing should be able to be transposed directly into a state heritage assessment and listing. We hope that this may be one factor in helping to overcome the imbalance on most State registers when it comes to engineering works.

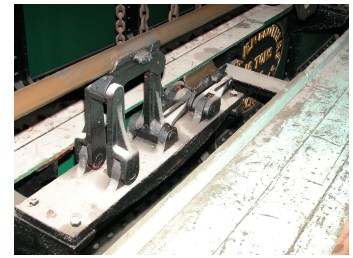
Bill Jordan, Convenor, EHA Plaquing Committee

The 1885 Craven Bros Crane continued from page 1

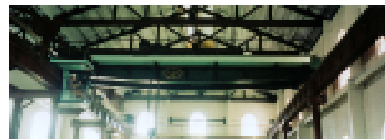
the introduction of small electric motors in the 1890s. Other cranes of similar specification were converted by adding electric motors and removing the rope and belts in the early 20th century.

Through a combination of circumstances, the Newcastle crane stayed in its original configuration, although the steam engine which drove the workshop, including the crane, was replaced by an electric motor in 1913.

The significance of the crane was recognized when conservation engineers Carl and Margaret Doring were commissioned to carry out a heritage study of the workshops complex when the NSW State Rail Authority was preparing to hand over the land to Government for redevelopment in 1990. The Dorings were subsequently commissioned to prepare a Conservation Plan for the crane and the work required was carried out by Hunter Valley Training Company apprentices in 1996.



The ingenious folding or "flip-flop" bearings used to support the keyway shafts driving the winch



The Craven Crane being operated by an EHA Newcastle member

No provision was made, however, for the continuing maintenance and demonstration of the crane and it started to deteriorate again. A group of Newcastle EHA members

approached the new Government owners, the Honeysuckle Development Corporation, and proposed an arrangement to maintain and demonstrate the crane; the offer was accepted and now members can be found on many Saturday mornings greasing and oiling and dressing the leather belts. Demonstrations are given at the start of EHA Newcastle engineering heritage walks and at other times by arrangement.

Bill Jordan

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Cobram-Barooga Bridge over the Murray River continued from page 1

The type of movable span bridge adopted for the River Murray was the lift-bridge whereby a horizontal span, counterweighted between two towers, could be raised vertically to provide a passageway for the steamers and their towed barges.

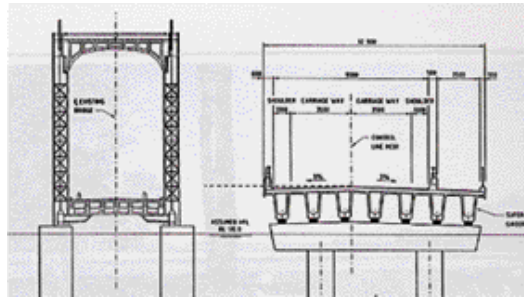
Beginning in 1893 at Mulwala and concluding at Abbotsford in 1928, eleven of these bridges were constructed, nine survive. The oldest pair are the 1895 railway bridge at Tocumwal and the 1896 road bridge at Swan Hill then the road bridges at Cobram (1904) and Barham (1905). The last three each consist of a steel lift bridge spanning the main channel and flanked by timber truss spans. The later bridges, 1926-1928, are all-steel structures. By that time the River Trade had become defunct.

With the significance of the lift bridges universally agreed, VicRoads and the Roads and Traffic Authority, NSW (RTA) produced a *Murray River crossings strategy* in March 2002 based on a balanced approach between the real needs of the transport system and the acknowledged heritage values of the old bridges, movable and fixed.

The need for five new non-opening bridges was identified. Those at Mildura, Tocumwal and Howlong have been built but, currently, only the old bridge at Mildura has been removed. The next new bridges planned are at Echuca and Cobram-Barooga. For the latter, VicRoads and the RTA have made and authorised extensive studies, heritage reports and community consultations, including comments from the Engineering Heritage Committee (EHC), Sydney, in developing a preferred option, see illustrations.

The initial proposal included demolition of the whole of the 1904 Cobram Bridge, timber beam approaches (long on the NSW side) and the river spans, lift structure and two deBurgh composite steel and timber trusses, on the basis that further downstream the retained Barham-Koondrook bridge has identical river spans but no long approaches.

Complete loss of the old bridge was strongly opposed by Victorian and NSW National Trusts, and Heritage Offices among



Cross section of the old lift structure and the proposed prestressed concrete bridge

many others, and complete retention was advocated. Matters of funding the maintenance of the whole bridge after decommissioning, potential for tourism and continued use as a cycle/pedestrian way were discussed.

However, the RTA was not prepared to allocate resources, particularly funds, to the expensive-to-maintain timber viaduct, the adjoining Shire Councils were not interested in becoming responsible

for the decommissioned bridge and community feelings were ambivalent so long as they got a new bridge. So an ALL or NOTHING situation had developed.

The EHC, Sydney, although sympathetic to the holistic approach, recognised that a compromise solution was preferred in the long-term whereby the best components be retained and the less significant elements be relinquished. Consequently, in accordance with *Section 6, Grading of Significance, Assessing heritage significance, Heritage Manual*, NSW Heritage Office, the river spans were identified as of "high to exceptional" significance and the timber approach spans were of "moderate" significance.

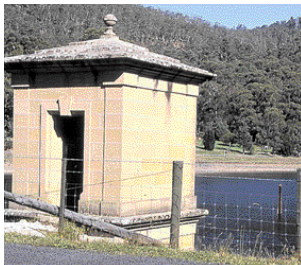
The RTA were advised that the EHC would not object to demolition of the timber beam spans provided the river spans were retained and linked to the new bridge. This plan was presented by the RTA as the modified preferred option at a meeting of stakeholders and RTA staff on 16 September 2003.

Some earlier issues were canvassed but overall there was broad agreement that the EHC compromise was acceptable and the RTA agreed to link the "stranded" river spans to both banks so as to provide access for tourists and other interested visitors, and provide an alternative cycle/pedestrian way. The RTA would consider funding the less-costly maintenance of the river spans.

The outcome was in keeping with the balanced approach of the *Murray River crossings strategy* and was a credit to the cooperative and inclusive approach of all parties.

Don Fraser, Engineering Heritage, Sydney

Tasmanian Photographic Archive Project



From the collection, the outlet valve house of Hobart's 1888 Upper Reservoir dam

Engineering Heritage Tasmania has many photographs, slides and negatives of the various engineers and engineering works in Tasmania. Unfortunately these have been kept in many locations and, as a result, any particular photograph has been difficult to find when required. Some other engineering heritage groups in Australia may be in a similar position.

Recently EHT has begun scanning, indexing and printing the total collection with the objective of relating each photograph to its data file. After scanning, the images are improved for exposure, contrast, colour balance, etc., using the graphics program PaintShop Pro. The images are saved in folders pertaining to the subject. The coverage in each folder depends upon the importance of the subject.

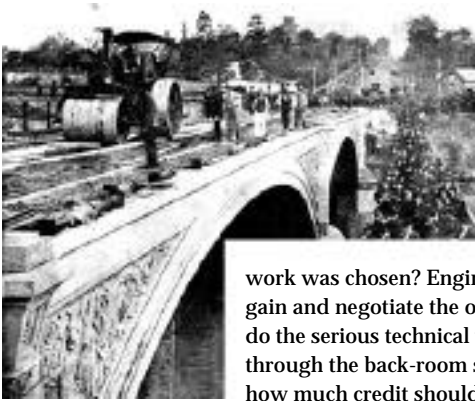
It has been noted that some of the colour slides and negatives are losing much of their value because of deterioration with age of the colour dyes. This will be overcome by storing in digital format.

For convenience at this stage, the images are being printed as large thumbnails, twelve to an A4 page, using Microsoft Publisher. Each thumbnail is named and numbered for ease of recovering the original (scanned) photograph, and separate pages are being printed for each person or project.

Now that the photographic collection is held in digital format and indexed, EHT is anxious to expand the collection. Members who may have photographs (prints, slides, negatives or newspaper cuttings) of any Tasmanian engineering project will be invited to donate or lend them for scanning.

Allen Wilson

Credit where credit's due?



Bridge testing in progress

work was chosen? Engineering offices often contain public figures who gain and negotiate the orders, and a number of “back-room” figures who do the serious technical work. Admittedly, the former have normally been through the back-room stage and have a good knowledge of design; but how much credit should they be given for any particular project? Even when we research a recent project - and are able to question the actual participants - we find several who sincerely believe they alone were responsible for its major features. And, as we all know, “history” takes on a life of its own as it is handed down from one story-teller to another - and even from one historian to another!

Several of these problems were encountered by the author and colleagues Geoff Taplin and Lesley Alves in researching the history of the Monier arch bridge built in 1899 to carry Anderson Street, Melbourne, across the diversion of the Yarra (now known as the “Morell” Bridge.) Many people, including engineers and amateur historians, were convinced that it was designed and built by (General Sir) John Monash. However, there were some who questioned this. As our research topic was Monash’s engineering prior to WW1, it was important for us to form our own opinion.



The 1899 Monier arch bridge today

The joint clients for the bridge were the PWD of Victoria and the City of Melbourne. Research showed the City’s records ascribed design and construction unequivocally to the Sydney firm of Carter Gummow & Co, which had earlier built the Monier sewage aqueducts at Annandale. The *Building, Mining & Engineering Journal* did contain a caption ascribing the bridge to Monash & Anderson, but this was quickly corrected at Gummow’s insistence. The revised caption said it had been designed by Carlo Catani of the PWD and built by Carter Gummow as contractors.

The weight of evidence from a variety of sources including the Monash & Anderson letterbooks, PWD and City records, newspapers and the *BEMJ* is that Gummow came to Melbourne to promote the Monier system; that he had already had contact with the Minister for Public Works; and that Anderson persuaded him to accept M&A as representatives of CG&Co in Victoria. Catani, Engineer-in-Chief of the Victorian PWD, settled on the basic concept of a three span bridge and steered the project through to the design stage, championing the novel technology and improving the design of the foundations. The major and most detailed contract drawing carries the stamp of CG&Co “Patentees of the Monier System”. It includes relatively elaborate analyses for asymmetric distributed load and point loads from steam rollers. Anderson took part in further negotiations on behalf of CG&Co and helped with preliminary practical arrangements before Gummow brought his manager George Forrest to Melbourne to start construction. M&A were paid a proportionate fee for these and continuing services. Monash’s “work diaries” show he was absent from Melbourne attending legal cases and contract arbitrations for almost all of the period during which the bridge was designed and built, returning shortly before the load-test.

Does this entirely rule out a contribution to the design from either Monash or Anderson? Not entirely, because the profiles of symmetrical arches at that time were fixed by a simple graphical calculation intended to ensure pure compression under self-weight and uniform live load. This initial form-finding could have been done in a few hours. However, there is no evidence in the form of drawings or correspondence to support the idea.

What is not evident from records specific to the Morell Bridge is the role of William (Wilhelm) Julius Baltzer. He appears near the end of the story when called over from Sydney to check signs of distress which developed shortly after the structure was completed. Most of what we know about Baltzer’s origins comes from the Report of a NSW Royal Commission into the awarding of the Annandale contracts. It was he who brought the Monier system to Australia from Germany. The M&A letterbooks show that he later tutored Monash in the analysis of Monier arches under non-uniform loads and in 1903 introduced him to German and French texts from which he subsequently derived much of his knowledge of reinforced concrete practice and theory. Baltzer continued to advise Monash for many years, but it was only when he became a partner of the new firm of Gummow Forrest & Co that he routinely signed letters. It may never be possible to know “beyond reasonable doubt” what was the proportionate contribution of each of the engineers involved in the Anderson Street Bridge project, but small details from many sources build up a picture of W J Baltzer as an unsung hero of the introduction of reinforced concrete to Australia.

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A Peake at Steam

EHA member Owen Peake is the Australian contact for the International Stationary Steam Engine Society. He has a large collection of information on the use of stationary steam engines in Australia. This column will, we hope, be a regular feature in the EHA Newsletter. We start with two mining engines.

Big Steam Winder in the West



Fraser & Chalmers steam winding engine at Sons of Gwalia gold mine

The Sons of Gwalia Gold Mine near Leonora about 150km north of Kalgoorlie in Western Australia has one of the largest and most impressive steam winding engines in Australia. The mine opened in the 1890's and the winder was installed on the main shaft in 1912. The

winder was lucky to survive as the mine was redeveloped from an underground mine to an open cut mine in the mid 1980's. At this time the winder was in the area where the pit was to be developed. Although no longer needed as part of the mining operation the winder and its winder house were relocated clear of the new pit. The winder house is a steel-framed corrugated iron clad shed. Although not fully assembled and bolted down the machine is complete and secure.

The winder was manufactured by the renowned British winder manufacturer Fraser and Chalmers of Erith, in south-east London. The engine is a very heavily constructed twin cylinder duplex Corliss valve engine with cylinder diameters of 29 inches and a stroke of 65 inches. The double parallel winding drums are 11'6" diameter and 4'3" wide. The shaft was at least 2000 feet deep and the engine wound 7 to 8 ton skips with a cycle time of about one minute.

The photograph shows the right hand cylinder and its tail rod assembly. The driving station is on a raised platform between the cylinders and is just visible at the left hand side of the photograph.

The winder is in the care of the Leonora Historical Society which also operates a museum in Leonora. There has been a lot of activity in recent years to develop the tourist potential of the little town.

Central Deborah Gold Mine, Bendigo

Gold was first discovered at Bendigo in 1851. Initially the rush was for alluvial gold but the field gradually made the transition to deep lode underground mining following the quartz veins down to great depth. The Victoria Quartz Mine eventually reached a depth of 4478 feet. By the time mining ended in 1954 over 25 million ounces of gold had been won.

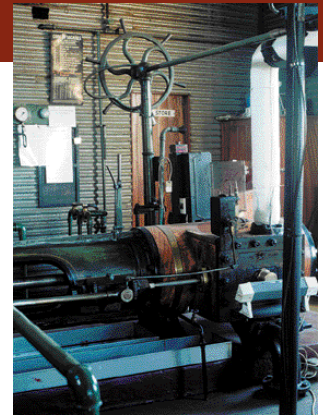
The last mine to be developed and the last to shut down was Central Deborah. The company was formed in 1939 to mine a section of the Deborah Reef not far from Bendigo Creek where the first gold was discovered in 1851. Early developments were held up by the war effort with both men and materials being in short supply. A major plant upgrade was commenced in 1944 including a steel poppet head to replace the original wooden structure, a larger second hand steam winder and a new electrically driven air compressor. The work was completed in 1946 and the shaft was sunk to 1347 feet however the returns were never as good as expected.

By 1953 the financial situation was critical and it was decided to continue operations on a "tribute" system. Returns did not improve and the mine closed on 22 December 1954 ending 103 years of continuous gold mining in Bendigo.

There was a desire in Bendigo to keep at least one mine for posterity and Central Deborah opened as a tourist destination in 1971. The site is virtually complete and a valuable engineering heritage site. Everything from the underground workings to the poppet head, machinery and processing plant remains in place.

The steam plant is complete and preserved. The medium sized duplex winder by A Roberts & Son of 1896 was locally built and saw service at four other mines before Central Deborah. It is a sobering thought that such competent machinery could be produced in a country town over a century ago when today most large machinery is manufactured overseas and imported.

Besides the winder there is the electrically driven air compressor built by Thompsons of Castlemaine, built in 1945, and a steam driven air compressor built by Ingersoll-Rand in 1912. Although Central Deborah was built quite recently much of the plant was second hand and techniques were largely unchanged from earlier mines. Central Deborah is like a time capsule and well worth a visit.



Steam winding engine at Central Deborah gold mine

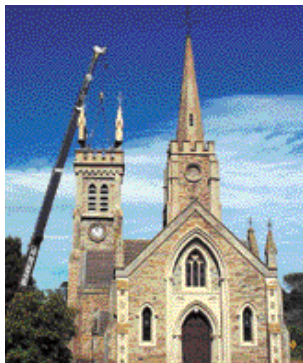
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How, then, did Monash acquire so many supporters? Prior to WW1 both he and Anderson placed at the head of their letters, and in their CVs, a list of projects on which their experience was based. Both included the Anderson Street Bridge. Monash included Princes Bridge, Melbourne, where he had detailed masonry and helped supervise construction as one of the assistant engineers. In later years Monash, or those who wrote about him, were wont to use a phrase of the form "it was the design and construction of the Anderson Street Bridge which set Monash on the path to success as a pioneer of reinforced concrete". Well, it did. Unfortunately, people came to interpret this as a statement that he had personally designed and constructed it. After WW1 the fact that Monash was a national hero probably encouraged this perception.

Information on what he really did do is available at: http://home.vicnet.net.au/~aholgate/jm/jm_intro.html

Alan Holgate

SA Division Heritage Engineering Excellence Award



The new spirelets being placed at St Andrew's Church

Parsons Brinckerhoff Australia Pty Ltd (Adelaide) recently received a 2003 Engineering Excellence Award in Heritage by the SA Division of Engineers Australia for their reconstruction of the St Andrews Church spire of Strathalbyn. The Church is listed on the National Estate Register and the National Trust Register.

St Andrew's Church began life in 1848 as a simple bluestone church but within a few years the local community had added a transept, spire, porch and gallery. Next to come was the bell tower complete with spirelets, bell and clock. By 1895 the church was complete. However, in their eagerness to complete their church in all its glory, the local parishioners may have compromised a little on quality. Luckily the structure was sound but in 1956 a storm blew down two of the 4-metre spirelets and the other two were taken down for safety reasons. The Strathalbyn skyline had lost one of its most treasured features.

In 1994 a public appeal was launched to raise the funds to restore the spirelets which finally resumed their rightful place in 2001. Parsons Brinckerhoff (PPK Environment & Infrastructure

as it was then known), when engaged by the Church Restoration Committee as engineers for the reconstruction of the spirelets, understood the need for the work to be a collaborative effort that made as much use of local contractors as possible, and that left a stable, permanent, low-maintenance legacy for the parish. The engineers also understood the limited funds available and the importance of normal church operations to community life.

Parsons Brinckerhoff consulted Heritage SA and State Archives to match the designs of the original spirelets and crosses. The materials and finishes chosen had the same appearance as the originals and were low maintenance in the long term. The spirelets were moulded after a trial run that ironed out minor problems with mix and procedure.

Incorporated in each spirelet was a grout tube for placing the crosses, an internal void to reduce weight and recessed lifting inserts for placing the spirelet onto the support frame. Two new crosses were fabricated to match the two remaining original crosses and all four were then hot-dipp galvanised. A steel frame, which was hidden by the parapet walls when in place, connected all four spirelets together. While the structure was still on the ground all four spirelets were positioned, and the crosses placed and aligned.

The frame also had the advantage of allowing the entire structure (weighing 11.2 tonnes) to be raised and placed in position in one lift. Stabilising rods limited the spread of the frame during the lift and were removed once the frame was on the top of the tower. Final grouting and fixing was easily carried out within the safety of the parapet walls of the bell tower which had been remediated before the lift. The new lightning protection system was then completed.

The spirelets were thus permanently restored with the least disruption to the congregation of this heritage listed church.

Nigel Ridgway

SHB on DVD

The 45-minute VHS video: The Construction of Sydney Harbour Bridge, produced by the Engineering Heritage Committee of Sydney Division, has proved to be a popular purchase in the years since it first appeared. The larger part of this production uses film taken by the well-known Sydney photographer Henri Mallard whose persistence earned him the right to risk his neck on the Bridge during the middle and later period of its construction.

Mallard was principal of the Sydney photographic company Harringtons and his search for a publicity vehicle for a new brand of 16mm home movie camera ended virtually on his own doorstep where one of the worlds great engineering projects was under way during the Great Depression. Extensive comments on the film were made in 1969 by Frank Litchfield, one of J.J.C. Bradfields engineering assistants on the work, and these have been added as sound track. Also part of the video are animated sections that explain the construction procedures. The end of the video draws on contemporary newsreels showing the opening ceremony in 1932 including glimpses of the de Groot incident.

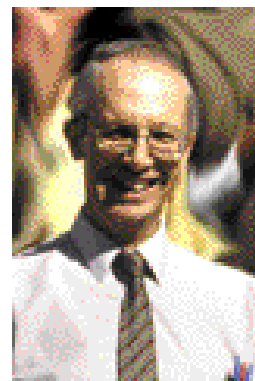
The good news is that the video is now available in worldwide DVD form, thereby extending its viewership outside the range of PAL countries. The price is \$27.50 Australian currency including GST (or at the discounted price of \$22.00 for IEAust members) to which must be added \$7.00 postage and handling for addresses in Australia or \$18.00 P & H for destinations outside Australia. Orders may be placed with Sydney Division IEAust, P.O. Box 138, Milsons Point NSW 1565, Australia. Enquiries: +61 2 8923 7100.

The VHS video (PAL system) continues to be available for the same price as the DVD and there is also an abridged version of the video of 25 minutes duration for \$16.50 (or \$13.75 for IEAust members) plus postage as above. Remittances are payable to Engineers Australia (Heritage).

Ian Bowie

Award to Ray Whitmore

The Royal Historical Society of Queensland has awarded one of two 2003 Fellowships to Professor Emeritus Ray Whitmore AM. The RHSQ citation states that Ray "contributed significantly to the study and publication of Queensland history particularly of the coal industry, Brisbane



Ray Whitmore at the 1982 NCEH conference

waterworks, and early heritage such as the windmill". The citation also recognises his work on the Institution of Engineers Heritage Committee, as a member of the Queensland Heritage Council, as a Member of the Council of RHSQ from 1986 to 1990, and his participation in a number of RHSQ conferences.

Ray was the foundation chair of our National Committee (formerly NCEH, now EHA), and chaired the committee for our first national conference in 1982 where the photo was taken. Ray attended the opening day of the recent Toowoomba Conference where he enjoyed renewing old acquaintances.

Vale Tom Lawrence:

The following obituary was supplied by historian Margaret Park



Tom Lawrence bushwalking

Thomas (Tom) Fulton Coleman Lawrence was born in Yass in 1915. He grew up at a time when the idea of Canberra and the federal capital territory was in its infancy. Tom talks about his memories of Canberra -

We knew of the existence of Canberra... we used to come over several times a year in T-Model Ford days... At that time it was a dirt track with deep ruts in it after the winter. We came over for the day, had a look at Canberra, visited the Cotter and had lunch there and drove around...

(Oral History Interview, April 2003)

Tom's engineering career spanned nearly 50 years from his early years as an engineering student at Sydney University from 1933 to 1937 to his retirement in 1980. Tom's father was the youngest of thirteen children. He immigrated to Australia from Scotland in 1908 arriving only with a box of carpenter's tools and £10. From early work in Crookwell, then Yass, Tom's father succeeded in establishing a prosperous carpentry/builder's business

in the district. Initially intending to pursue a farming career Tom was encouraged to pursue an academic education by his father. This milestone changed his life as he went to live with his grand-parents in Bondi and attended Sydney Boys High for his leaving certificate. Always interested in mathematics and physics, Tom embarked upon an engineering course at Sydney University.

After receiving his engineering degree, Tom applied for a post in Victoria and succeeded in being appointed as the Testing Officer within the Department of Civil Engineering at Melbourne University. It was here that an opportunity arose for Tom to further explore his interest in wind tunnels when he became involved with the design and construction of a replacement 9' x 7' model wind tunnel for the University. At first he discovered that -

there was a tin shed between the engineering school and Gratton Street and in that tin shed was a thing called an Eiffel tunnel, which is one of the early forms of wind tunnels... a World War I vintage wind tunnel... that was in the mechanical engineering branch of the faculty [at Melbourne University], not civil engineering ... (Oral History Interview, April 2003)

From 1940 Tom worked within the Division of Aeronautics at CSIR and helped to set up a full-scale 9' x 7' wind tunnel at

Fishermen's Bend. During the war Tom effectively had three jobs: the foundation technical officer at ARDU (Aircraft Research and Development Unit), experimental work at Fishermen's Bend and engineering tutoring at Queens College during the evenings.

Tom returned to Sydney University in 1944 to undertake additional wind tunnel research and assist engineering graduates. At this time he -

spent a year at Sydney University doing all sorts of things to shake down [their] wind tunnel... for instance as I understand it, [the tunnel] ran off the power which supplied Sydney trams that meant that we couldn't use it at the two crush periods, morning and evening. (Oral History Interview, April 2003)

His career took many turns including a brief sojourn within the private sector and an overseas posting as the Principal Scientific Officer at the Royal Aircraft Establishment at Farnborough, UK extending his career into the field of rocket research and testing of supersonic speeds.

Back in Australia Tom worked on a number of projects within the Long Range Weapons Establishment, later known as the Weapons Research Establishment, and was appointed the Principal Scientific Officer within the Supersonic Aerodynamic Division. In 1968 Tom volunteered to move to Canberra and took up the position of Controller of Research & Development within the Department of Supply; within a year he was promoted to Deputy Secretary. Tom continued to work within with the restructured Department and was instrumental in the disaster recovery work following

Cyclone Tracy in Darwin. With his experience and skills, Tom was able to assist Colonel Reno Vardanegar supply stores and transport needs throughout the recovery period. Colonel Vardanegar recounted -

It was about two days before I found the time to discover that Tom Lawrence was a deputy secretary in his department. Long before that, however, I had learned that his claim had been a valid one; there seemed to be nothing he could not obtain, given the urgency, and, at times, a scrap of paper with my initials on it. There was no task that was beyond his organising genius. ⁶ (Canberra Times, 20 January 1975 p7)

Apart from his engineering and historical interests with the Canberra and District Historical Society, Tom was a busy man throughout his life. Married with three sons, he not only fitted in his career but was passionate about skiing as a form of relaxation and recreation. He was a foundation member of one ski club and a member of four clubs in total. He also regularly volunteered for maintenance duties at his parish church. Tom was appointed a member in the Order of Australia (AM) in 1978 and was a foundation member of the Order of Australia Association.

The oral history interview conducted with Tom Lawrence is an example of the work performed by the Canberra Panel of Engineering Heritage Australia. They are in the process of coordinating interviews with other notable engineers with equally significant contributions to the nation's development in association with their parent body, Engineering Heritage Australia.

Toowoomba Hosts a Great Conference

Engineering Heritage Conferences, like our specialty, are a judicious blend of past, present and future. Our 12th Conference in Toowoomba in late September 2003 was no exception. It had the ambiguous topic *Engineering Heritage Matters!* The participants were emphatic that EH *mattered*; they also discussed many other relevant *matters*.

In this report, all dated works are on the Queensland Heritage register.

The three-day pre-conference tour commenced on Thursday 25th September with our party of 45 reaching speeds of 170 kph on a Queensland Rail state-of-the-art tilt-train. At Maryborough, the party inspected the works where the tilt-trains were built. EDI Rail was formerly part of Walkers Ltd of Maryborough, who, for over a century, have been heavy engineers in rail, mining, sugar and shipbuilding. The small but progressive foundry of Olds Engineering made a huge contrast. Olds specialise in a range of short run products from small engines to marine propellers and aluminium stirrups, and they use steam-powered lathes. The first day ended with a stroll to a Civic Reception.

The second day involved visits to the 1896 Lamington Bridge (a pioneering reinforced concrete bridge with a HEM plaque), the Gympie mining museum, and Somerset and Wivenhoe Dams. The overnight stay at 1891 *Woodlands Retreat* included a splendid banquet provided by SEQ Water in the rural mansion. The final day took the party to Kholo reservoir, the much-modified 1891 Mount Crosby Waterworks, and on to Ipswich. There the party saw QR's heritage locos and rolling stock being maintained in the 1900 Railway Workshops and enjoyed the newly opened Workshops Museum. After lunch, the bus passed the 1936 Burley Griffin incinerator, now a little theatre, and the heritage residences on Denmark Hill, before stopping at the 1875 Grandchester Railway Station, Queensland's first railhead. In Toowoomba, the party dined in the superbly refurbished 1933 Empire Theatre after touring its equipment and facilities.

The Sunday welcoming function at the Toowoomba Golf Club followed visits to the 1847 Royal Bull's Head Inn, Oakey Army Air Base and the 1859 Jondaryan Woolshed.

The three-day Conference started on Monday 29th. The Honourable Ian MacFarlane MP, Member for Groom and Federal Minister for Industry, Tourism and Resources, opened the Conference. Professor John Brannock, Chair of the Queensland Heritage Council, delivered the keynote address, and chose to challenge engineers, and the media (who gave it front-page treatment), with the notion of *modern heritage*. He argued that some works were of such significance that he felt they should be listed soon after completion. Delegates warmly greeted Professor Emeritus Ray Whitmore AM, who was chair of the first national conference in 1982, and also the first chair of what is now EHA.

Thirty papers were then presented to the eighty-nine delegates at the conference. Most papers were delivered in single sessions.



The Southern Cross Windmill ready for the HEM unveiling

A conference highlight was the placing of a Historic Engineering Marker on a Southern Cross windmill, on Tuesday 30th September. The windmill was specially erected at the Toowoomba City Council's Visitors' Information Centre as a joint effort by Toowoomba Metal Technologies (TMT) and Tyco Southern Cross, the successors to the original Griffiths' company, Toowoomba Foundry, which produced over 200,000 Southern Cross windmills in the 20th century. EHA Chair Bruce Cole, EA National VP Peter Cockbain, and EA Qld President Les Louis spoke on aspects of the significance of regional engineering and windmills. Toowoomba Deputy Mayor, Councillor Peter Wood accepted the mill on behalf of Toowoomba City. The unveiling of

the plaque by Les Louis and Peter Wood was reported in all regional media. Following the ceremony, the delegates visited Tyco Southern Cross and the 1874 TMT works.

The last Railway Refreshment Room operating in Queensland was the scene for the conference dinner. It is part of the exceptionally well-preserved 1874 Toowoomba Railway Station complex.

Ian Waples, formerly Chairman of EHA Qld and recently retired Main Roads Heritage Manager, was the Toowoomba anchorman for the conference. Bill Oliver was the able conference chair. Norm Sheridan coordinated the papers and Robin Black was the EHA link on the conference committee. The Meetings and Events Office of the University of Southern Queensland undertook the conference administration. Delegates felt it was an affordable and successful national conference.

If you missed the conference EHA Qld would gladly provide you with itineraries for part of your next visit to the Sunshine State.

Tour of Rocky & Mt Morgan

EHA(Qld) are planning a two or three day tour of engineering heritage in the Rockhampton and Mount Morgan areas midyear 2004. Tilt-train from Brisbane or join in Rocky for the bus component. Make it part of your winter touring in Queensland to avoid the southern winter chill. Register your interest with Robin Black at rgblack@powerup.com.au

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